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S T A F F.

The distribution of the Veterinary Staff at the end of 1935 was as follows :-

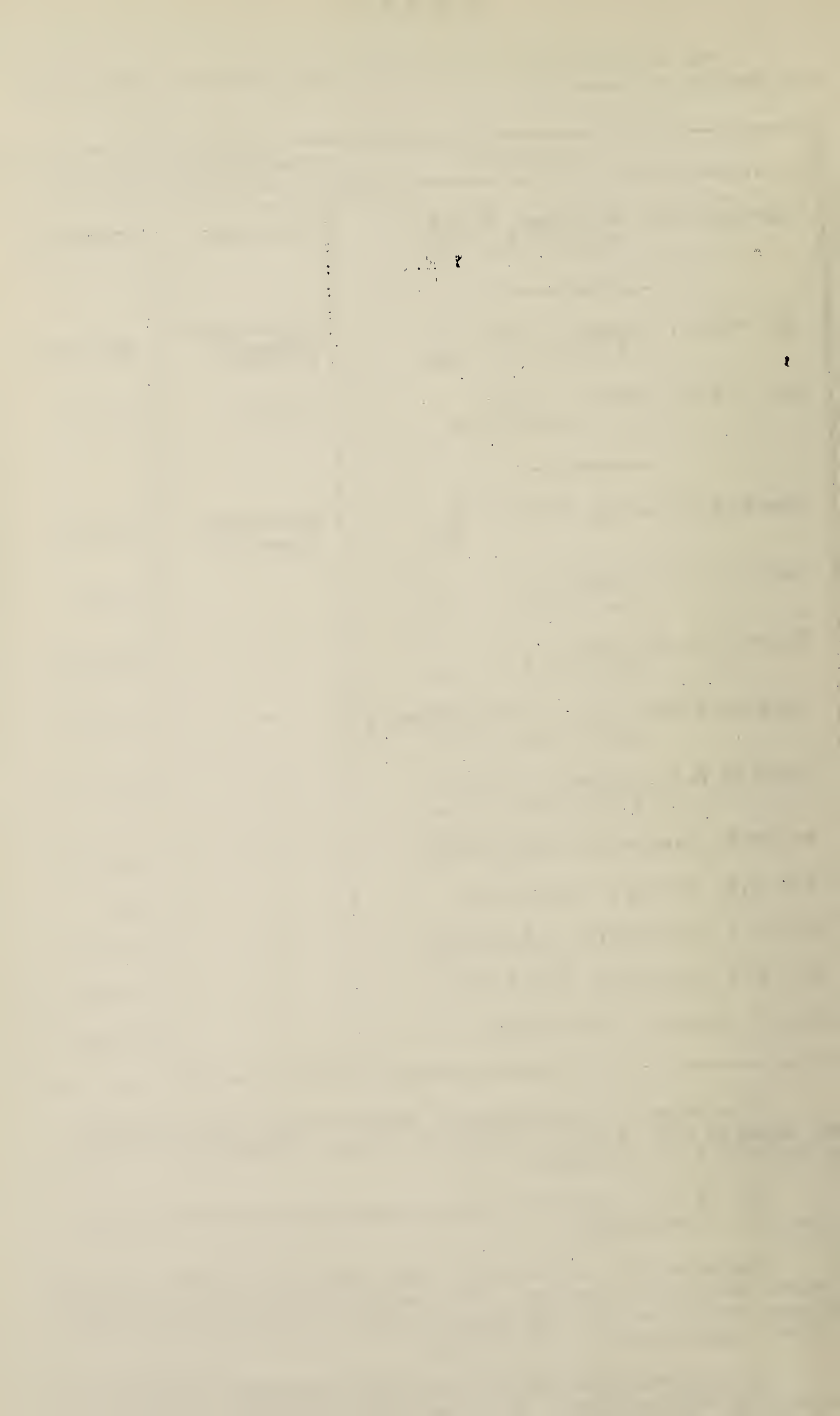
N A M E	: Designation	: Station
Captain H.B. Williams, O.B.E., M.R.C.V.S., 4N.	: Director	: Khartoum
-----O*O-----		
Dr. S.C.J. Bennett, D.Sc., M.R.C.V.S., 4N.	: Veterinary : Research : Officer	: Khartoum
Mr. J.T.R. Evans, B.Sc., M.R.C.V.S.	: Asst/Dc.	: Malakal
-----O*O-----		
Captain J. Goings, M.R.C.V.S., 4N.	: Veterinary : Inspector	: Kassala
Captain C.F. Fisher, M.R.C.V.S., 4N.	: "	: Kosti
Major J.R. Ellison, M.R.C.V.S., 4N.	: "	: Malakal
Captain T.Menzies, D.V.S.M.(Vict.) M.R.C.V.S., 4N.	: "	: El Obeid
Captain L.E.Prichard, O.B.E., M.R.C.V.S., 4N.	: "	: Wad Medani
Mr. W.H. Glanville, M.R.C.V.S.	: "	: Khartoum
Mr. J.E. Furney, M.R.C.V.S.	: "	: Wau
Mr. J.A. Gillespie, M.R.C.V.S.	: "	: El Fasher
Mr. A.W. Chalmers, M.R.C.V.S.	: "	: Wad Medani
Mr. P. Durran, M.R.C.V.S.	: "	: El Obeid

His Majesty King George V Jubilee Medal was conferred upon Captain R.S. Audas, Captain J. Goings, Captain C.F. Fisher and Captain H.B. Williams.

Dr. S.C.J. Bennett, D.Sc., was appointed to the Order of the Nile, 4th Class.

Captain R.S. Audas, M.C., 3N., retired in February after 27 years Government service. The vacancy created by his retirement was filled by the engagement of Mr. P. Durran, M.R.C.V.S., on first appointment on 12-10-1935.

On the amalgamation of Blue Nile and Fung Irovinces the possibility of the Senior Veterinary Inspector, Wad Medani and his Assistant taking over the work of the Senior Veterinary Inspector, Singa, was explored and found feasible with the provisions of extra motor transport.



An extended tour of the Southern Provinces during April and May convinced the writer that the posting of a Veterinary Inspector and a small subordinate staff to Bahr el Ghazal Province for work in the Dinka areas, which have an estimated cattle population of three quarters of a million, would be fully justified on economic grounds. An export trade in cattle should be found possible and the hide and skin trade calls for supervision and development. A scheme submitted for an extension of veterinary activities to Bahr el Ghazal was financially approved. In October a Veterinary Inspector, freed by the abolition of the post of Veterinary Inspector Fung Province, was appointed to Wau, and a small locally enlisted staff was engaged to be trained by him.

Although satisfactory reports continue to be received of the work of the Tribal Veterinary Retainers in the field yet it is felt that owing to the smallness of their numbers, particularly in the immense pastoral areas of Baggara tribes, they are unable to cope with extensive outbreaks of disease and that in order to supplement them in cases of emergency every effort should be made to train in simple inoculation work some of the Tribal Ghaffirs on the ray of the Native Administrations.

The Veterinary Inspector, Darfur Province, reports :-

"The District Commissioner, Southern Darfur, "is particularly keen on this arrangement. His contention "is, and I agree with him, that it is better for a Nazir "to have at his disposal an ample staff of 'dual purpose' "retainers than a small group of specialists which, "although fully employed when disease is rife, is too "small to be adequate, and when disease dies down is not "fully employed."

Dual purpose retainers may be employed where sufficient supervision can be guaranteed to ensure that they are kept up to date in their technique.

S E C T I O N I.

DISEASES OF ANIMALS.

1. DISEASES OF CATTLE.

Rinderpest.

At the end of the year the position as regards rinderpest was far from satisfactory. The disease, which was widespread in Darfur, Kordofan, White Nile, Blue Nile and Kassala Provinces before the onset of the rains, died down when there was sufficient surface drinking water to permit of effective segregation, only to recur with increased intensity in the autumn and spread widely to surrounding districts. While there was sufficient rinderpest anti-serum available to meet all needs losses were light, but when early in December our stock of serum was almost exhausted and it was found necessary to ask Veterinary Inspectors to restrict its use

to those herds in which its employment could be economically justified losses were heavy. Rinderpest vaccine, produced under difficulties owing to lack of accommodation and equipment was largely used to supplement our supply of serum.

The Blue Nile figures of 205 outbreaks involving 20,926 head of cattle, with a mortality of 5%, include for the first time returns from Northern and Southern Fung Districts.

The losses were remarkably light in the closely supervised districts of the Gezira, and correspondingly heavy in a nomad district such as Singa where, owing to distance and inaccessibility, a large percentage of cattle became infected before preventive measures could be employed.

In November a "Note", explaining the benefits which would attend annual vaccination against rinderpest of working oxen in the Gezira area, was submitted to the authorities concerned. The Sudan Plantations Syndicate agreed to give the suggested annual immunisation scheme a year's trial. The work of vaccinating the Syndicate's 4,500 plough oxen is now proceeding. If, as is anticipated, this becomes an annual arrangement, and in addition the tenants can be persuaded to have their own stock done, not only may the Syndicate be assured that their ploughing programme will not be interfered with by waves of rinderpest, but also the cattle-owning tenants may, with succeeding years of immunity from serious outbreaks of the disease, gradually gain confidence and increase their herds. Men with sufficient livestock to provide the manurial requirements of the soil from which they gain their livelihood, to supply their own milk and fat needs, and to allow of a beast or two being sold annually are likely to make happier and more settled tenants than many of those now to be found in the Gezira. The Veterinary Inspector, Blue Nile Province, reports that many natives have already had their cattle vaccinated on payment. This is in striking contrast to their attitude of a few years ago, when they usually refused to accept even free treatment for their animals.

Reports from Kordofan Province show that the disease has been more widespread than in 1934. Early in the year minor outbreaks occurred in the Messaria herds, which continued to simmer throughout the rains and flared up in the autumn. Quarantine measures entrusted to the Tribal Authorities were tightened up, as there was evidence to show that many owners did not make any effort to prevent their cattle, particularly calves, from straying towards infected herds, knowing that if they contracted disease their losses, with the help of serum, would be small and that they would be relieved of the anxiety of further infection for a year or two. This would be an ideal policy if there were sufficient serum available for the country's needs, but with growing confidence on the part of the natives and extensions of veterinary activity to new areas it is becoming increasingly difficult to meet all demands. At the end of the year several outbreaks were reported in the Humr herds and in Eastern Jebels District. The latter District has enjoyed comparative freedom from rinderpest for the last few years, therefore large losses may occur if serum or vaccine is not always at hand for prompt control of outbreaks. Approximately 29,000 cattle were treated in Kordofan Province by the serum-nasal-swabbing method and in addition 12,000 cattle were vaccinated.

The Veterinary Inspector, White Nile Province, reports outbreaks involving 94,693 head of cattle of which 32,090 were seruminised. In five outbreaks when no serum was given the percentage of deaths was 27.8%, as compared with 4.9% in treated outbreaks.

During the year 136,272 full doses of cattle plague anti-serum and 41,646 doses of rinderpest vaccine were issued for use in the field, compared with a maximum issue during any previous year of 102,000 doses of serum only.

Contagious Bovine Pleuro-Pneumonia.

No cases of contagious bovine pleuro-pneumonia were reported from Kassala and Upper Nile Provinces, and only one outbreak occurred in Blue Nile Province.

In Darfur Province, where the disease is enzootic, the Rezeigat reported heavy outbreaks towards the end of the year, but vaccination is very popular and owners of cattle availed themselves, whenever possible, of opportunities to use it. The difficulty of persuading all owners to destroy infected cattle remains, as in the past, the one stumbling block to an effective control of the disease. In treated outbreaks, involving some thirty-one thousand head, seventeen thousand were vaccinated and 310 died or were destroyed.

Outbreaks were numerous in Western Kordofan and were attributed to the spread of infection by trade cattle moving in from the West. The Veterinary Inspector, Kordofan Province, reports :- "Small scattered outbreaks occurred throughout the Province. The heaviest losses occurred amongst the trade cattle brought in from the West. Fortunately the presence of this disease is now more promptly reported than previously, thereby greatly assisting in its control." In Kordofan Province 17,890 cattle were inoculated with contagious bovine pleuro-pneumonia vaccine and only 243 deaths occurred in treated outbreaks.

All cattle for export to Egypt were vaccinated at the time of registration. Over 50,000 doses of contagious bovine pleuro-pneumonia vaccine were used in the field during the year.

Trypanosomiasis.

Cases of T. congolense infection were reported from Upper Nile, Blue Nile and Darfur Provinces. The disease is not of pressing economic importance in these Provinces as there is ample fly-free pasturage available all the year round, and the small percentage of cases which occurs may be attributed to carelessness on the part of the cattle owners, who either move too early into, or stay too late in, areas which they know quite well may be infested with biting flies or tse-tse fly in the rainy season. Up to date, owners have merely been pressed to destroy all infected beasts and thus eliminate reservoirs of infection. Should treatment by "Surfen C" be as successful as is anticipated, and the cost of injections be within the reach of Baggara cattle owners, it may be possible to treat on payment the few cases that occur in their cattle. This drug, too, may be of use when schemes are being considered for the introduction of cattle into tse-tse fly areas of Mongalla Province.

In Kordofan Province a fly survey carried out round Kadugli revealed no tse-tse fly. Twelve of the fifteen bulls of the Kadugli District hamla died from T. congolense infection, whilst cattle on the Agricultural Experimental Farm nearby remained healthy throughout the rains.

Twelve bulls kept on native cultivations near Kadugli and Talodi, as an experiment on the possibility of keeping cattle all the year round in those areas, maintained good condition.

Foot-and-Mouth.

An outbreak which occurred in a small herd of cattle near Shendi in December, 1934, cleared up in January of this year without surrounding herds becoming infected.

No further cases of this disease were reported on the trade routes until an outbreak occurred in October at Khartoum North Quarantine in a consignment of cattle which had arrived from Kordofan Province en route for Egypt. The disease was of an extremely mild form, foot lesions were rare and the health of the animals was only slightly affected. Great difficulty, however, was experienced in infecting all the cattle in the consignment.

An outbreak at Wadi Halfa Quarantine in November in cattle awaiting export to Cairo resulted in a suspension of the cattle trade to Egypt via the Nile route. Energetic measures were taken to spread the disease to the healthy animals in the consignment, and by the end of the year all had become infected.

During the latter part of the year foot-and-mouth disease was prevalent in the herds of export cattle grazing near El Obeid and Kosti. The veterinary staff at these centres took active steps to disseminate the disease with the result that large numbers of recovered cases, which showed very slight loss of condition, were collected and segregated by the end of the year with a view to a re-opening of the export trade from these entraining stations early in the new year.

With the exception of the export cattle traders, the natives of the Sudan pay very little attention to the disease. All outbreaks which came under notice were of a mild form and no deaths were attributed to the disease. One can frequently pass through a heavily infected herd without observing any external symptoms of the disease. The cattle appear bright in the coat and graze contentedly, though when on very dry grazing there may be slight salivation in a few cases.

Should the disease remain present in the Western Sudan during the coming year, provision will have to be made for inoculation with infective material of all cattle intended for export at the most opportune time, i.e. as soon as there is ample green grass available to allow of their contracting the disease under the most favourable feeding conditions, thus ensuring a minimum loss of condition.

Anthrax.

Three cases of Malignant Pustule were discovered amongst natives of the Nuba Mountains early in the year, but the source of infection, which was alleged to be a pig, was not definitely established.

No positive case in cattle was reported during the year.

M a n g e .

Some 40% of the working oxen on the Gezira were infected with psoroptic mange during the year. Mild cases were treated with oily dressings and advanced ones sold for slaughter.

Anaplasmosis.

The only case reported occurred in Blue Nile Province.

2. DISEASES OF CAMELS.

Trypanosomiasis.

The heavy rains experienced this summer resulted in a continuance of the high incidence of trypanosomiasis reported last year in Camel Corps and Eastern Arab Corps camels. Military training necessitating the keeping of units in fly-infested areas resulted in many animals becoming re-infected after treatment with Naganol. The work of constantly retesting these Sudan Defence Force camels and treating the positive cases has thrown a good deal of extra work on the Veterinary Inspectors concerned.

Returns show that some 10,000 camels received intravenous injections of Naganol during the year, of which over 7,600 were privately-owned animals treated on payment. The latter figure, compared with 3,200 odd in 1934, is a striking illustration of the rapidly increasing popularity of this treatment among native camel owners. In Blue Nile Province alone natives brought up over 5,000 for treatment, and the figure of 1,100 for Kassala Province would have been largely exceeded had there not been such a ready market for camels of any type or condition for export across the frontier.

As a result of demonstrations and propaganda the knowledge of the value of Naganol treatment is rapidly becoming widely known amongst the large camel-owning tribes of Northern Kordofan, and an increasing demand from that area may be anticipated in future years.

Approximately £E.1,900 was received for treatment of privately-owned animals.

As explained in the Veterinary Research Officer's report, a provisional raising of the routine dosage of Naganol from four to five grammes was decided on.

M a n g e .

The camel units of the Sudan Defence Force were again free of mange, and the incidence of the disease was reported to be lighter than usual amongst Sudan Government camels.

Contagious Necrosis.

Cases occurred during the rains in the Camel Company stationed at Bara. Prompt treatment and the movement of the Unit to a new station resulted in a rapid recovery of the sick animals without the usual high percentage of incontacts becoming infected.

3. DISEASES OF EQUINES.

African Horse Sickness.

Three cases of African Horse Sickness occurred at Zeidab, Northern Province, two of which died and one recovered. Forty mules of the Mounted Infantry Company, Camel Corps, El Obeid, became infected while out on a training march, and sixteen deaths occurred. The heavy casualties may be attributed to sick cases being moved during the early stages of the disease when marked clinical symptoms were not observable.

The Senior Veterinary Inspector, Wad Medani, whose observations on African Horse Sickness in the Gezira cover a period of ten years reports :-

"The first cases invariably occur between
"20th October and 10th November and the incidence of
"the disease is high for the following month, but
"gradually diminishes in intensity from early
"December to the end of January, becomes high again
"during February and then dies down, the last cases
"occurring at the latest in early March. The disease
"may be said to appear with the advent of the North
"wind, i.e. end of October, and continues
"intermittently during the period the wind blows
"from that quarter, i.e. to early March. With the
"coming of the South wind cases cease to appear.
"The disease does not occur in the rains."

In order to safeguard the expensive imported polo ponies the efficacy of a vaccine prepared in Kenya Colony is being tested. Should the virus from which this vaccine is prepared prove to be identical with that found in the Gezira and produce a twelve months immunity, then not only will the chief obstacle to the keeping of valuable imported horses in the Gezira be removed, but also the breeding of improved stock in an area which can produce the required foodstuffs become a more attractive proposition.

Epizootic Lymphangitis.

When one considers that more rapid means of transport yearly allows of increased veterinary supervision the total of 29 positively diagnosed cases compares favourably with that of previous years.

Native horse owners are gradually being taught to realise that it is impossible for them, in almost all instances, to cure cases of this disease and that it is a much sounder proposition to destroy cases as they occur

rather than attempt problemetical cures and, at the same time, run the risk of infecting the rest of their stock. The spread of this knowledge during the past few years has undoubtedly resulted in a marked lowering in the mortality attributable to epizootic lymphangitis occurring in horse-breeding tribes of Kordofan and Darfur Provinces.

Of twenty cases reported from Blue Nile Province the majority occurred in Police animals of Fung District. Infection is thought to have been largely contracted through tick sores in the region of the axilla and perineum. As a preventive measure clipping, and daily dressing of the axillary and perineal regions with a mixture of sesame oil and a locally prepared vegetable tar, is being enforced.

Ulcerative Cellulitis.

An advanced case showing clinical symptoms was destroyed in the Nuba Mountains.

Equine Influenza.

A case of benign, though highly contagious, form of influenza was first observed at Khartoum last March in a batch of remount horses shortly after their arrival from Darfur Province. The pronounced symptoms were a rise in temperature varying from 102° to 105° accompanied by a copious nasal discharge. A secondary complication in many cases was abscess formation in the region of the jaw. No other serious complications occurred and mortality was nil. An untoward incident was the number of animals that became re-infected a few weeks after recovery from a first attack.

Infection spread to the Sudan Horse at Shendi and many cases also occurred in and around Khartoum, and in the Gezira area.

An outbreak of trypanosomiasis occurred in animals of the Sudan Horse while the unit was on a special training march in the Upper Nile Province. The disease was first reported on 2nd March from Jokau. On 12th March there were 36 cases, and three or four fresh ones came to light daily. On 4th April from blood smears sent to Malakal *T. brucei* was diagnosed in ten horses and one mule. By 8th April deaths had totalled 30. The animal strength of the unit on arrival in the Upper Nile Province was 384 horses and 182 mules. Deaths from trypanosomiasis totalled over 70.

4. DISEASES OF SHEEP & GOATS.

The incidence of pleuro-pneumonia in sheep and goats was light. The only outbreak in which heavy losses were reported occurred in a flock of 1,000 goats at Tonj.

5. DISEASES OF CANINES.Rabies.

Since the beginning of the year 61 cases of rabies have been diagnosed at the Stack Medical Research Laboratories, of which 49 were dogs, 9 donkeys, 1 sheep, 1 fox and 1 camel. The following table shows the distribution of cases, which occurred in all Provinces except Upper Nile, Mongalla and Darfur :-

Table showing number of positive cases
of rabies diagnosed at the Stack Medical
Research Laboratories, Khartoum
During 1935.

PROVINCE	M o n t h s												TOTAL
	Jan:	Feb:	Mar:	Apr:	May:	Jun:	Jul:	Aug:	Sep:	Oct:	Nov:	Dec:	
Northern	1	-	-	-	-	-	1	-	-	-	1	1	4
Khartoum	2	1	3	1	-	-	-	1	-	-	-	-	8
Kassala	-	1	-	-	1	1	1	1	2	1	2	3	13
Blue Nile	2	1	2	-	2	1	2	-	5	1	2	-	18
White Nile	-	1	1	-	-	-	-	-	1	1	-	1	5
Kordofan	-	-	1	-	-	3	-	2	2	2	-	1	11
Bahr-el-Ghazal	-	2	-	-	-	-	-	-	-	-	-	-	2
TOTAL....	5	6	7	1	3	5	4	4	10	5	5	6	61

The increase in the number of cases diagnosed over last year may be attributed to a spread to remote districts of the knowledge of the importance of the early reporting of suspected cases, particularly those that have bitten, or have been in contact with, humans, which has allowed of material being collected in a fresh state for diagnosis, and to an increase in the incidence of the disease in certain closely supervised areas.

Under the powers conferred on them under the Rabies Ordinance, 1930, Governors have, whenever the disease has been diagnosed, prohibited the movement of dogs from the infected areas for periods of from three to six months, and carried out an intensive campaign for the destruction of superfluous and ownerless dogs. In the case of the Khartoum outbreak which started in January a chain-up order was enforced with satisfactory results.

The destruction of a large percentage of the dog population of Khartoum, and the keeping under restraint of others, has resulted in a large increase in the numbers of cats living in a semi-wild state, and of mongooses. To exterminate these undesirable inhabitants of our gardens trapping on a large scale has been instituted.

The poisoning of jackals and hyenas is being more extensively carried out than in the past, particularly in the neighbourhood of towns.

SECTION II.

TRADE IN LIVESTOCK & LIVESTOCK PRODUCTS

1. EXPORT & IMPORT TRADE

Cattle and Sheep.

This year's figures of the numbers of cattle and sheep exported to Cairo, Alexandria and Suez show a marked improvement on those of the previous year, and would have made even better reading had there not been an unfortunate interruption in the trade to Cairo owing to an outbreak of foot-and-mouth disease in a consignment of cattle at Wadi Halfa Quarantine.

The outbreak, which occurred on 17th November, resulted in the Egyptian Authorities closing Shellal Quarantine to Sudan sheep for 19 days, and to Sudan cattle for a period of three months from the date of the appearance of the last case in the infected consignment.

Owing to the appearance of cases of foot-and-mouth disease in a consignment of cattle from Kordofan, the Khartoum North Quarantine was closed from mid October to 31st December. This outbreak occasioned only a slight interruption in the export trade, as it was found possible to bring into immediate use the old cattle quarantine at Ed Damer.

Foot-and-Mouth disease, though an extremely mild disease of cattle in the Sudan and for the time being of small economic significance as regards internal trade, looms up as a malady of the greatest economic importance when viewed in relation to our cattle export trade to Egypt. The Egyptian Veterinary Service naturally contemplates with alarm the possible introduction of a disease which might assume a more severe form under conditions prevailing on the irrigated and intensively cultivated lands of Egypt.

When one considers the vast area in the Sudan, possibly half a million square miles, over which the native-owned herds are pastured, it is obvious that any form of control aiming at the final eradication of the disease would meet with little success. The policy, for the time being, of this small Service is to concentrate its efforts on keeping free from the disease, at the time they are required for export, those cattle purchased by merchants for sale in Egypt.

A large increase in the number of cattle exported during June and July was due to two factors :-

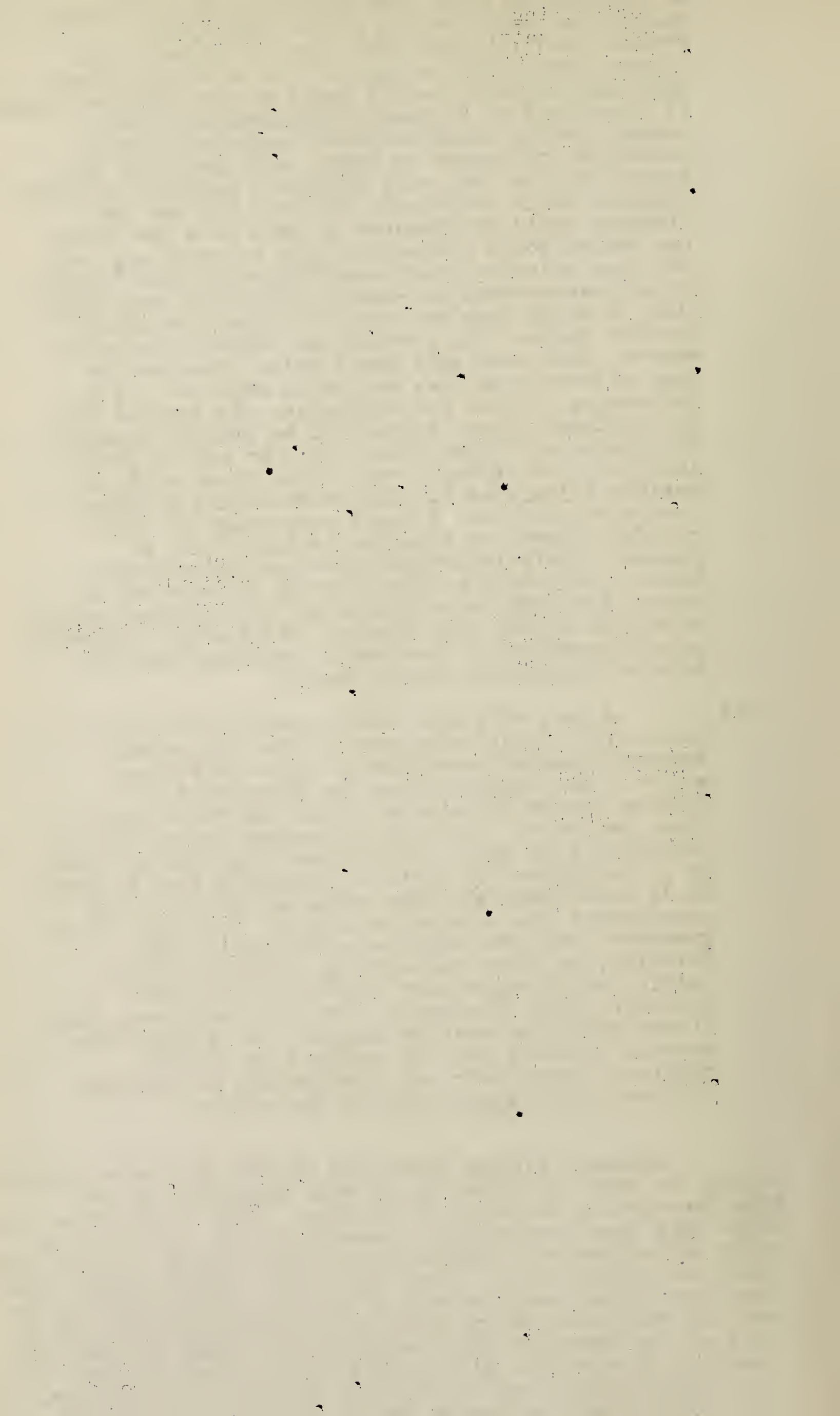
- (a) The export to Egypt of 1,000 head of cattle purchased in Nasir District, Upper Nile Province, by Northern merchants. This successful experiment allowed of the Egyptian market being supplied with fat cattle at a time of the year when Northern cattle were not available in sufficiently good condition for export. The merchants are obviously satisfied with the financial side of the new venture, as they have asked for arrangements to be made for them to buy during the coming year. The Governor, Upper Nile Province, has arranged for a series of markets to be held in Nasir District in April and May. Doubts have been expressed as to whether sufficient cattle will

be forthcoming after last year's heavy purchases. Though the cattle owners of the Upper Nile Province suffer their full share of losses from disease they still manage to rear more male stock than they require, and it would be for their own good if they could be persuaded to dispose of their annual surplus of mature marketable bullocks to merchants for export to Egypt, and their old and barren cows to the local slaughter markets. If these animals, which eventually die from old age and disease, could be disposed of even at a low figure the owners would ultimately gain in every way, as the true breeding stock would increase more rapidly if not overcrowded at pasture or in the large grass huts in which they are kept at night-time during the wet season. At present the useless castrated beasts, even when past their prime, receive the same attention as cows and young heifers. With increasing contact with Europeans and traders from the Northern Sudan, wants will be created amongst the Dinkas and Nuers, which will be met by goods imported from abroad : but unless these wants are rapidly stimulated it will be difficult to make them part with even a small percentage of their saleable stock, as taxation is light and, at present, their immediate needs are ridiculously small. Their cattle cost nothing to rear and in those districts where owners are safeguarded against excessive losses from disease, which might otherwise entail purchases of new stock, receipts from the sale of animals are wholly profit.

- (b) A new, if short lived, market in Eritrea. Some 2,184 cattle purchased in the West passed through Kassala Quarantine en route to Eritrea prior to 24th August, when the Government of Eritrea placed an embargo on the import of cattle from the Sudan. Cases of contagious bovine pleuropneumonia were said to have been diagnosed at Asmara in a consignment of cattle originating from El Obeid. It is quite possible that cases did occur in the consignment that arrived at Asmara, but there is no guarantee that the cases were in cattle from Kordofan, as there was nothing to prevent other cattle, which might have filtered across the frontier, from joining in with the consignment while it was moving on hoof to Asmara. It is known that several thousand head of cattle from Kassala Province found their way into Eritrea in addition to those which passed through Quarantine.

Customs' figures show that 21,568 sheep were exported during the year, of which 19,511 were forwarded to the Egyptian markets and 2,057 to Eritrea. This is the first time since 1925 that exports have exceeded 20,000, and there is every indication of a continuance of the revival in this trade which set in last year. There has been a steady demand from Egypt for prime sheep throughout the year, and following the good and well-distributed rains of this and last year there has been available an ample supply of fat sheep to meet all demands. In addition to the sheep which passed through quarantine on their way to Eritrea, probably many thousand were driven unnoticed across the frontier for sale.

Trade sheep remained remarkably free of disease.



Further details of the trade in cattle and sheep are given in the following tabulated statements :-

A. Numbers and values of cattle and sheep exported during the last four years

Year	Cattle	Sheep	Valuation at port of export
1932	3,472	4,271	£E.14,763
1933	5,518	4,963	24,210
1934	8,963	15,642	50,311
1935	14,596	21,568	84,765

B. Numbers of cattle imported during the last four years.

Year	French Equatorial Africa	Eritrea	Abyssinia	Total
1932	113	36	301	450
1933	401	20	782	1,203
1934	3,437	-	821	4,258
1935	5,764	-	1,662	7,426

C. Origin of cattle exported during the last three years.

Province	1933	1934	1935
Kordofan and Darfur	4,910	6,228	5,684
White Nile	700	540	3,300
Upper Nile & Bahr el Ghazal.	40	455	1,144
Khartoum	160	426	480
Blue Nile	-	-	200
Northern	350	1,020	2,100
Assala	-	20	-

D. Average market prices and total number of cattle sold for export in El Obeid market during the last 4 years.

Y e a r	Number of cattle sold	Average price
1932	2,435	£E.1.405 ⁷ / ₈ s
1933	2,355	£E.1.376 ⁷ / ₈ s
1934	1,789	£E.1.810 ⁷ / ₈ s
1935	6,759	£E.2.087 ⁷ / ₈ s

Camels.

Customs figures show that camels to the number of 12,652 were exported to Eritrea up to 26th November, when sanctions were applied. The above figure only includes those that passed through frontier Customs posts and it is impossible to assess, even approximately, the number that crossed the border unrecorded. Last year it was estimated that 30,000 camels were exported to Egypt, whereas this year only 22,500 were sent there. Reports from camel-raising districts show that many more camels were sold than was the case in 1934. The rise in prices in these districts too was further proof of the abnormal sales which took place, and one may reasonably surmise that not less than 20,000 camels crossed into Eritrea. Following the imposition of sanctions prices fell and merchants turned their attention to the Egyptian markets which had been neglected for some months previously. During December many permits were issued for consignments to proceed by road to Upper Egypt.

Mules.

The Senior Veterinary Inspector, Kassala Province, reports that there was a shortage of Abyssinian mules on offer for sale at Gallabat and that he experienced great difficulty in completing the Sudan Defence Force and Sudan Government requirements of 169 remounts.

Hides and Skins.

Except for slack periods in March and October the demand for Sudan "flint-dry" and "dry-salted" hides was good throughout the year and there was a steady rise in prices. Egypt and Syria were, as in 1934, our best customers; the former taking 366 and the latter 680¹/₂ metric tons out of a total export of 1,226¹/₂ metric tons valued at £E.45,768.

In marked contrast to the conditions which prevailed in the hide trade, the demand for skins was poor and prices slumped. Of the 991 metric tons exported America took 814¹/₂, including almost all the best quality skins from the "hair" sheep of Northern Sudan. The decline in prices noted during

the latter part of 1934 maintained until November when merchants reported a slightly improved demand and brighter prospects of a rise in prices. The value of skins exported fell from £E.75,901 in 1934 to £E.54,403 in 1935.

Except in the case of severe outbreaks of rinderpest in distant Nomad districts, when there is insufficient labour to flay large numbers of dead beasts, the hides of practically all cattle that die in the Sudan are saved.

Giving the Sudan a cattle population of some 3,000,000 head grazing over an area of fully 500,000 square miles, it is surprising that about one third of the 600,000 hides, which it is estimated were produced during the year, should have found its way to foreign markets.

There has been a ready market abroad for some years for mixed consignments of hides, which has permitted of the movement of poor quality hides from even the remote districts of Darfur; in many cases involving a camel carry of 600 miles and a train journey of 400 miles to Khartoum or, in the case of "Fashoda", long carriage by carriers to Meshra el Peg and river transport thence to Omdurman. Thus hides produced in Darfur or Equatorial Provinces may be transported 1,500 miles before they are eventually shipped at Port Sudan.

Khartoum and Omdurman are the only real centres of the hide export trade, and here are to be found the few stable merchants who form the back-bone of the trade and carry on whether times are good or bad; in marked contrast to the gambling element which participates only on a rising market when there is a possibility of a large and quick monetary return.

Although it is realised that healthy competition is to be encouraged, the action of these merchants, not regular traders in hides, who on "inspired news" buy and hold up large quantities of hides for a rise in price, has a most unsettling effect on local prices and is to be strongly deprecated as interrupting the normal flow of the trade, owing to regular merchants not being able to obtain their normal requirements for fixed contracts.

During the latter months of the year there was an increase in the percentage of well-prepared hides in consignments arriving from Darfur as a result of demonstrations of improved methods of flaying and preparation carried out at Fasher, Nyala and other centres. The Veterinary Inspector, Darfur Province, reports that one of the draw-backs of the improved methods is that hides folded lengthways, as recommended, make awkward loads for bulls and camels and that, in consequence, transport camel owners have at times refused to carry these cumbersome loads.

Merchants buying wet hides at the large slaughtering centres report a marked improvement in slaughter-house hides due to more careful flaying. The native slaughterman can, with very little care, despite the fact that he works with a very unsuitable type of knife, produce a hide without knife marks, cuts or scores.

Experiments are being carried out with a cheap locally produced knife similar in pattern to that in use in the United Kingdom. When the most suitable type has been found, every endeavour will be made to bring it into general use in the Sudan.

The District Commissioner, Tonj District, has for some years carried on a "lone" campaign to encourage the Dinkas of Bahr el Ghazal Province to produce a better, and therefore more valuable, hide by showing them how, by taking a little more care over flaying and ensuring that the hide is dried off the ground, they can market a greatly improved product. At first these hides were sold to local traders for a slightly enhanced price compared with that obtainable for ordinary trade hides; later on the output was, for some months, sold to a hide dealer, again at a slightly improved price; and finally the suggestion that this Service, as a temporary measure, should auction the hides at Khartoum was agreed to. These auctions have been remarkably successful and not only has there been a steady rise in the average price obtained throughout the year, but also an equally steady improvement in the quality of the consignments. Remarks on the condition, quality and apparent defects of each consignment were forwarded to interested parties in Bahr el Ghazal Province.

Reference the following table, which gives particulars of the consignments of selected hides shipped from Meshra el Req, Bahr el Ghazal Province, and sold by the Veterinary Service at Khartoum, it is worthy of note that at no time during the year did the price of "flint-dry" hides sold in the open market at Omdurman exceed 51 milliemes an oke :-

D a t e	Weight in okes	Amount realised	Average price per oke
		<u>SE. Mms</u>	<u>Mms.</u>
27- 4-35	8,699	392.559	45.1
11- 5-35	8,748	387.516	44.3
5- 6-35	7,568	348.857	46.1
1- 7-35	408	17.340	42.5
12- 8-35	11,432	608.024	53.2
29- 8-35	1,647	95.019	57.7
7- 9-35	364	18.200	50.0
23- 9-35	3,123	179.491	57.4
7-10-35	1,201	66.606	55.5
21-10-35	2,284	121.815	53.3
4-11-35	1,210	71.739	59.3
18-11-35	567	35.376	62.5
2-12-35	762	46.863	61.5
31-12-35	1,760	108.442	62.5
TOTAL.....	49,773	2497.847	

The quantities of hides and skins exported during the last five years and the average values per ton were as follows :-

Y e a r	Hides		Skins	
	Tons	Average value	Tons	Average value
		per ton		per ton
		£. E.		£. E.
1931	818½	23.8	899½	65.1
1932	712	16.3	862	45.4
1933	1,207	30.0	1,057	48.9
1934	1,115	31.2	1,168	67.6
1935	1,226½	37.3	991	54.9

Samn or Maslee (Clarified Butter).

A large demand from a new quarter, coupled with increased purchases by Egypt, led to a great activity in the samn export trade. Export figures showed a jump from 519 tons in 1934 to 897 tons in the year under notice. Although a new market, Eritrea, took over half the total exports, 459½ tons, it is pleasing to note that Egypt our oldest and, in previous years, best customer increased her purchases to the record figure of 433 tons.

Almost all the trade samn is prepared by the Baggara tribes of Kordofan, Darfur and White Nile Provinces, who sell it to small merchants at the local markets. These merchants, who are usually the agents of large distributing merchants or firms, clean and pack the samn in four-gallon petrol tins, which make ideal containers, before dispatching it to railhead. Nearly one thousand tons were sent from El Obeid by rail or motor transport to the chief exporting and distributing centres of the Sudan.

2. INTERNAL TRADE.

Numbers of animals slaughtered during 1935 in the following ten towns :-

Town			Camels	Cattle	Sheep	Goats
Khartoum	...	...	12	2,579	30,503	75
Khartoum North	...	...	2	669	9,205	87
Omdurman	...	...	173	5,292	34,957	1,245
Wad Medani	...	...	618	2,452	16,923	372
El Obeid	...	...	297	4,801	10,911	229
Atbara	...	...	31	1,015	10,718	39
Kassala	...	...	108	1,708	10,209	636
Gedaref	...	...	161	1,270	3,891	127
Wadi Halfa	...	...	1	200	5,118	19
Port Sudan	...	...	75	1,562	21,331	5,064
TOTAL			1,478	21,548	153,766	7,893
Total for 1933			2,013	18,812	155,234	4,410
" " 1934			1,277	21,325	169,153	6,243

The supply of animals, with the exception of sheep, for local slaughter was ample to meet every demand and although the prices ruling were slightly higher than those of last year, this factor was compensated for by the better average condition of the animals slaughtered in 1935. A brisk demand for sheep from Egypt and the sale of an unknown number to Eritrea caused a rise in local prices, which is reflected in a reduction compared with last year of nearly 16,000 in the number slaughtered at the ten large towns shown in above table.

SECTION III.

IMPROVEMENT OF LIVESTOCK

Cattle.

The Veterinary Inspectors, Kordofan, Darfur and White Nile Provinces report large increases in the number of "scrub bulls" sterilized by means of the Burdizzo emasculator. The Baggara tribes have now had ample proof of the rapidity and safety with which their own Tribal Veterinary Retainers can carry out the operation, and the retainers themselves are "keen" as they, no doubt, feel that it adds to their prestige to be armed with such an imposing-looking instrument.

The existence in Koalib Hills, Kordofan Province, of a breed of dwarf cattle showing a marked tolerance to trypanosomiasis led to a belief in certain quarters that such cattle could be safely introduced into the tse-tse fly areas of Mongalla Province. As an experiment two bulls and two cows were purchased and sent to the Zande District. Owing to the absence of veterinary staff to supervise and report on the experiment full details of what happened to the cattle after they arrived in the tse-tse fly area are not forthcoming. By May only one of the animals, a bull, remained alive; presumably the others had died of trypanosomiasis.

For some years small herds of cattle, mostly imported from Belgian Congo, have been maintained at certain centres in the tse-tse fly belts of Zande and Moru Districts. Those at Source Yubo and Li Pangu are grazed in bush-free areas of the leper settlements and it would appear that the mortality amongst them is not even counterbalanced by the stock reared; this despite the fact that prophylactic treatment against trypanosomiasis is carried out. Possibly the administration of drugs may account for the low fertility of the stock.

The herds at Yambio and Meridi were built up of cattle imported from tse-tse fly areas in Belgian Congo. There are no records of births, deaths or purchases, but it is known that the herds have not increased in numbers. There is sufficient cleared land in each place to provide ample grazing at a safe distance from the surrounding bush.

In addition to the above, a small experimental herd has been established at Aruba on the Amadi-Terrakeka road. The District Commissioner, who has had a large area cleared of forest, has obtained cattle for the herd from the nearest local source, Terrakeka, where good breeding stock is to be found.

The impossibility of obtaining local herdsmen with any knowledge of stock-keeping may have been largely responsible for the lack of success which has so far attended the experimental introduction of cattle into fly districts where sufficient land has been cleared of scrub to allow of the animals being grazed without danger of infection from tse-tse fly living in the surrounding bush.

Arrangements are being made to employ, as a temporary measure, a Dinka herdsman to each herd. A Dinka instinctively knows what precautions are necessary to prevent fly getting at his herd and also has fair knowledge of how to successfully breed and rear cattle. In May last the majority of cows in the herds were neither in-calf nor giving milk. It is hoped that there will be an improvement with the introduction of these herdsmen and, provided drugs are not used prophylactically, it should be possible to obtain valuable data as to whether or not it will be economically sound to introduce cattle on a large scale into the Zande and Moru Districts as a means of relieving the existing meat and animal products starvation which so adversely affects the health of the natives.

Reference has at times been made to a large herd of cattle kept by the Native Chief at Langu in a natural tse-tse fly -free area, surrounded on all sides by tse-tse fly infested forest. The impression appeared to be that this herd increased normally and that losses from disease were not excessive. A casual question by the writer as to the size of the herd in 1925 showed that it had decreased from about 320 head in that year to about 230 in 1935. The Chief could not account for these losses, and

the isolated position of the herd appeared to rule out rinder-pest and contagious bovine pleuro-pneumonia. Eventually he remembered that he had suffered heavy losses when, during exceptionally dry years, the water supply on his fly-free "island" had failed and he had been forced to send his cattle to a near-by river to water. The losses were undoubtedly due to trypanosomiasis, and show how necessary it is to ensure that experimentally cleared areas contain an unfailing supply of drinking water.

G o a t s .

To overcome the existing lack of animal food in Zande District of Bahr el Ghazal Province, which is said to be a predisposing factor to the high incidence of leprosy there, the Governor obtained financial approval for the experimental introduction of a large number of the small short-haired goats, believed to have a tolerance against trypanosomiasis infection, which are to be found in other parts of the Province. The scheme received an unfortunate set-back owing to an outbreak of pleuro-pneumonia, causing 42% casualties, which occurred in the flock of 1,000 before it left Tonj where the goats were purchased. Those which arrived safely at Yambio were distributed by the District Commissioner to the local chiefs in flocks of twenty. The risk of large losses will in future be minimised by purchasing and dispatching the goats in small flocks of 50 to 60. With supervision, and provided the goats have the expected resistance to trypanosomiasis, it is hoped that the flocks may become successfully established in the district.

Horses.

In reporting on the improvement of horses, one has to record the great loss to this sphere of veterinary endeavour sustained by the retirement of Captain R.S. Audas, M.C. He will long be remembered by his British and Native friends as the originator of the "Audas" scheme to improve the breed of horses in the Sudan. This scheme was originally intended to embrace all horse-breeding districts, but Captain Audas quickly realised that the greatest progress would be made by concentrating on Darfur, where the contributory factors essential for the production at a low cost of horses of the required standard were to be found, i.e. water, food and climatic conditions, which allow of the rearing in large numbers of an improved type of horse. He also felt that this was the Province in which the amenability of the local horse owners, amongst whom he had worked for many years, and the co-operation of the Provincial officials could most be counted on. The success which immediately followed the inauguration of the scheme in Darfur was undoubtedly due to the personality, exhaustless energy and enthusiasm of its sponsor Captain Audas. By his retirement the Sudan has also lost an official whose knowledge of the game animals of the Western Sudan was unrivalled.

A year of good rains in the three horse breeding centres of Darfur, Kordofan and Khartoum (including Gezira and Shendi) has resulted in an excellent supply of grass, grain and milk being available for the feeding of young stock.

Reports from Darfur show that although considerable losses were caused by African horse sickness the number and condition of half-bred stock reared was well above the average. For the Sudan Defence Force alone 111 remount horses were purchased at the Darfur horse shows and, in addition, a number of high-class hacks and potential polo ponies were sold to private purchasers. The seventeen Government stallions at stud in Darfur at the end of the year were said to be in magnificent condition. There were three casualties :- "Gamil", a very popular country-bred, once the property of Captain Audas, was destroyed in May on account of age; "Diamond Jubilee", a very old Egyptian country-bred, and "Nasr el Din", an Arab, died in November.

Successful horse fairs were held at Sinut and Muglad, Kordofan Province, at which 55 horses were purchased for the Government. Reports show that with easy food and water conditions prevailing the state of the animals, particularly the young stock, was excellent at the end of the year. Services by the three country-bred and five Arab stallions stationed at Abu Zabaḍ, Nahuḍ and Muglaḍ totalled 408.

A popular horse show, organised by the Officers of the Sudan Horse, was held at Shendi early in the year. Twenty good-class river-side bred horses were bought during the year at Shendi, mostly the progeny of the Government stallions at stud there.

Many good looking foals sired by the thoroughbreds, "Oberto", "Viaduct" and "Singlass" have been seen this autumn, and the number of high quality two-year-olds by T.-B. sires which have appeared on the Khartoum and Waḍ Medani race courses show that under very artificial conditions, only possible near the river, luxury horses of good size and conformation can be successfully reared.

This year's losses were made good by the purchase of an Arab horse "El Pais", in Egypt, and of Darfur reared country-breds. In addition, the Arab horse "Credit" was generously presented to the Government by Mr. G.A. Contomichalos, O.B.E.

S E C T I O N I V .

M I S C E L L A N E O U S .

Grazing and Water.

Grazing and water conditions over the pastoral areas of the Sudan were extremely good throughout the year as a result of the favourable and well spaced rains of 1934 and 1935, and the slight damage caused to crops and grazing by locusts. All sheep exported have been in exceptionally fine condition and the condition of the cattle held at El Obeid and Kosti awaiting export was excellent until they suffered a slight loss of flesh when outbreaks of foot-and-mouth disease occurred amongst them.

Veterinary Hospitals.

The following sick animals were treated at Khartoum and Wad Medani Veterinary Hospitals :-

Khartoum	.....	8,129
Wad Medani	.....	9,415

The civil and Sudan Defence Force forges in Khartoum, previously run as separate units, have been amalgamated. This has allowed of the civil shoeing being more closely supervised, and the Sudan Defence Force men undergoing courses in farriery being given a more extensive practical course.

A similar amalgamation of the Civil and Army pharmacies has permitted of closer control and better distribution of the staff's duties.

There has been a considerable increase in the work done at the combined forge, where 2,825 pairs of shoes were fitted and hundreds of mules and horses hooves received attention.

Government Animals.

Table giving added totals of Government-owned animals and those for which forage allowance was drawn, and approximate death rates for 1935 :-

Horses	1,208	Mortality	9%
Camels	1,267	"	14%
Mules	858	"	7%
Donkeys	789	"	4%

The general health of the animals remained particularly good throughout the year.

Purchase of Remounts.

Besides meeting the remount requirements of the Sudan Government services, 167 horses, 93 mules and 46 camels were purchased for the Sudan Defence Force. The Veterinary Inspector, Kassala Province, who buys all riding camels for the Sudan Defence Force, and has in past years had little difficulty in completing his requirements during November and December, had, owing to the large purchases of camels which had been made for export to Eritrea, bought barely half the required number by the end of the year.

An Eritrean Government agent purchased one hundred horses in Darfur Province early in the year.

Acknowledgments.

In concluding my review of the year activities of the Veterinary Service, I wish to record my great appreciation of the unfailing help given by Sudan Defence Force, Provincial and all Departmental staffs in assisting this Service to carry out its duties. Their kindly co-operation, so freely given, is essential if the degree of control of our major problems, rinderpest and contagious bovine pleuro-pneumonia, aimed at by this Service is to be maintained over the vast pastoral areas of the Sudan. The introduction of rinderpest vaccine, in addition to more extensive administration of all existing laboratory products, a reorganisation of the cattle trade, and an increased supervision of the hide and skin trade, have in the past year added to the already heavy duties which the members of my own staff were called upon to perform. I would take this opportunity of expressing to them my grateful thanks for the whole-hearted and loyal support they have always given me, even when working under trying conditions, in both the "field" and laboratory.

(Signed) H.B. Williams

SAM.

DIRECTOR, SUDAN VETERINARY SERVICE

ANNUAL REPORT
OF THE VETERINARY RESEARCH OFFICER
SUDAN GOVERNMENT
FOR THE YEAR ENDING DECEMBER, 1935.

A. ROUTINE WORK

The main items have, as usual, been preparation of cattle plague antiserum and bovine pleuro-pneumonia vaccine, issue of diagnostic materials and naganol for the control of camel trypanosomiasis, and examination of material sent to the laboratory. Cattle plague vaccine - a new product to the Sudan - was issued during the second half of the year. A certain amount of work, partly routine, and partly demonstrational and experimental, was carried out on the curing of hides.

I. CATTLE PLAGUE SERUM

The Assistant Veterinary Research Officer describes the past season at Malakal as "the most favourable working period experienced so far", the result being an output of the largest volume of serum hitherto prepared, viz: 5,508 litres, or 110,160 "full doses" of 50 c.c. Potency tests proved it all to be up to the required standard.

This favourable outcome was due primarily to an adequate supply of large cattle, supplemented by the successful control of trypanosomiasis whereby the great majority of serum producers could be kept in use for the maximum practicable time. (Investigations on the control of trypanosomiasis will be recorded in the section on Research). Grazing was again plentiful, thanks to the continued reservation by the Governor of a large area of land for laboratory cattle.

The supply of small (young) susceptible cattle used as virus producers again remained adequate, thanks largely to the co-operation of the District Commissioner, Abwong, who not only arranged for the supply of the bulk of such cattle in the first place, but also arranged for the exchange of over 100 which proved immune for fresh ones. Such exchanges of immune for susceptible cattle are advantageous both to the laboratory and to native owners.

The health of the Malakal technical staff was better than in earlier years. Although serum production is the main function of the Malakal laboratory, other duties are gradually being undertaken, and, with a technical staff which can at best be regarded as minimal, very little sickness may throw the whole unit out of gear. It is hoped to increase the subordinate technical staff in 1936, and if approved an effort will be made to fill any vacancy with a literate Southerner. If this proves a success, the principle may be subsequently extended if occasion arises, since the Northerners now employed at Malakal are neither happy nor healthy.

Casual labour was adequate, and, with the exception of one short-lived general "strike", the local labourers behaved fairly satisfactorily.

II. CATTLE PLAGUE VACCINE

Although a few thousand doses of this product were issued in 1931, and the results obtained with it were excellent, it was not until the second half of 1935 that issues on a fairly large scale were undertaken. As the Malakal laboratory was not sufficiently equipped for preparing vaccine on a large scale, most of this was prepared in Khartoum. Its preparation has been difficult owing to the absence of adequate accommodation and equipment, and could only be undertaken at the expense of almost complete suspension of research. In 1936 facilities are to be afforded for its continued preparation.

The vaccine used is of the original glycerinised tissue pulp type introduced in 1918 by Kakizaki. The reasons for adopting this type, in preference to the formalinised vaccine that has more recently largely superseded it, will shortly be published in a paper embodying one's researches on this product during the past few years.

In the six months during which it has been prepared 41,646 standard doses have been issued. All cattle destined for export to Egypt have been vaccinated and no case of cattle plague in any such beast has occurred in any Sudan quarantine.

III. CONTAGIOUS BOVINE PLEURO-PNEUMONIA VACCINE

Demands for this product have continued to increase. 51,090 doses were issued as compared with 26,420, 31,200 and 47,260 respectively in the three preceding years. More than two-thirds of these were issued to Kordofan and Darfur, while the Upper Nile, White Nile and Bahr el Ghazal Provinces took most of the remainder.

Towards the end of the year several cattle which had been vaccinated in the field with virus cultures transplanted between 70 and 80 times proved not to be immune when exposed some months later to infection. Cultures of such age are not generally issued, and it is significant that such failures have not been reported for four or five years during which younger cultures have constituted the vaccine. It is interesting to compare this observation with recent reports from Nigeria. In that Territory cultures of well over 100 generations in artificial medium appear not even to be safe, whereas in the Sudan the above note shows that cultures substantially younger than this have lost not only their virulence but also their immunising power.

One inexplicable accident occurred in a vaccinated herd. Of 584 cattle vaccinated, 50 developed large potentially fatal swellings. Many of these were slaughtered for food (the affected quarter being condemned) and the remainder died. About a further 50 developed lesser local lesions which subsided. The vaccine used was of the 47th generation. The inexplicable feature lies in the fact that not only had 7,000 doses of younger generations of the same strain already been used without accident, but that 520 doses of the same batch of vaccine, prepared on the same day in a single sample of culture medium, and issued on the same day to two other stations, behaved quite normally. This is the first accident reported since 1930. Fortunately the owners of the cattle (exporting merchants) were not greatly perturbed, and admitted that the benefits they had received from vaccination in the past greatly outweighed these losses.

IV. CONTROL OF CAMEL TRYPANOSOMIASIS

The progressive annual increase in the issue of materials for the diagnosis and treatment of camel trypanosomiasis continues. 10,081 doses of naganol were issued as compared with 990, 2,901 and 4,219 in the three preceding years, and issues of other associated materials have risen in proportion. As in earlier years, a substantial proportion of the increase has been due to increased demand for treatment (on payment) of privately owned camels, although the year has been a particularly bad one, and usually extensive treatment of officially owned camels has also been necessary. Some observations of practical importance have been made in the course of field operations; these will be discussed in the section on Research.

V. EXAMINATION OF SPECIMENS

There has again been a slight increase in the number examined - exclusive, of course, of material originating within the laboratory. Including a few dealt with at Malakal 585 specimens were examined. Most of these have necessarily been of little interest, but the following are worthy of short note :-

1. Cryptococcus Infections.

- (a) Five cases of lachrymal or conjunctival infection were diagnosed, all in horses.
- (b) One case which appears to have originated as an ophthalmia. The subject was a horse which developed unilateral ophthalmia which progressed for a month after original diagnosis in spite of orthodox treatment. A supraorbital abscess then developed, the pus of which contained cryptococci.

2. Trypanosomiasis.

Forty cases of T. brucei, thirteen of T. congolense and one double infection with both the above species were diagnosed in horses. A few T. congolense infections were also diagnosed in cattle. All cases originated in well known trypanosomiasis areas. Some of the equine T. congolense cases were sent to the laboratory and submitted to experimental treatment with Surfen C (Bayer). These cases will be discussed in the section on Research.

3. Leishmaniasis

One case of cutaneous equine leishmaniasis was diagnosed in Southern Kordofan. This is the first case of its kind in veterinary history. The horse was sent to the laboratory for study, and will be further mentioned in the section on Research.

4. Osteoporosis.

A horse's skull was received from Darfur showing the classical symptoms of the "big-head" type of osteoporosis. A considerable number of horses and mules in the same locality had developed various kinds of obscure lameness and bony swellings. The worst cases were destroyed and the remainder successfully treated with bone meal.

5. Miscellaneous. The following uninteresting diagnoses were also made :-

- | | | |
|---------|---|---|
| Horses | : | Piroplasmosis (<i>Nuttalia equi</i>), filariasis, epizootic lymphangitis, strangles, various septic infections, ringworm. |
| Mules | : | Epizootic lymphangitis, various septic infections, filariasis, ringworm. |
| Donkeys | : | Epizootic lymphangitis, ringworm, filariasis. |
| Cattle | : | Anaplasmosis, theileriasis. |
| Fowls | : | Spirochaetosis. |

Also a number of non-specific diagnoses in a variety of animals.

VI. HIDES.

In earlier years little has been done with laboratory hides beyond flaying them as carefully as possible and selling them to local merchants. This year, both at Khartoum and Malakal, the material has also been used for demonstration and experimental purposes. In Khartoum, demonstration has been almost the sole object, since none but light hides have been available. These do not find their way to a reputable market and one could not obtain useful tanners' reports on the relative merits of pieces cured in various ways. They are, however, as useful as heavy hides for demonstrating the principles of flaying, fleshing, drysalting, flint-drying and folding. At Malakal, in addition to demonstrations, heavy hides have been cured in various ways and sent to England for tanner's opinion as to the best method for general use in this country. Reports on them had not been received at the end of the year.

B. R E S E A R C H

Planned research has been steadily diminishing for a number of years in consequence of the steady increase in routine work. The only item that has received relatively steady attention has been cattle plague vaccine. Work on this has now ceased and the results are being incorporated in a paper shortly to be published. Other items that have received attention during the year are mentioned below.

I. CAMEL TRYPANOSOMIASIS

Although the essential features of camel trypanosomiasis control have been fairly thoroughly understood for three or four years, it has been the policy to regard field veterinary officers as engaged in extended research on this disease, with the view of effecting a more perfect adaptation of laboratory findings to field practice. Unfortunately, however, field work in general has recently so increased as to force this ideal progressively further into the background. Nevertheless, in spite of this, and of having for the second year in succession encountered an unsuitable season for studying the particular points at issue, some useful information has been gleaned.

The most troublesome feature in the economic control of camel trypanosomiasis in the Sudan is the often unavoidable necessity for keeping camels in an infected area after treatment. Could they but be removed, or otherwise protected from infection after treatment, control would be easy. Diagnosis would be effected by the mercuric chloride test, all positive reactors could be given a dose of Naganol, and very few relapses would occur. Cure could be checked at one or two subsequent inspections by again applying the mercuric chloride test. With many camels this is possible, and in most seasons the period of exposure to infection is so short that the residual protective effect of so small a dose as four grammes of Naganol is of sufficient duration to protect against subsequent reinfection. It is with the occasional necessity for keeping camels in bad areas, and in long "fly" seasons, that difficulties arise.

Knowledge previously acquired showed that a single intravenous dose of 4 grammes of Naganol effects a primary cure in the vast majority of camels. It had also been found that a period of "immunity" (actually protection by residual Naganol) follows treatment, and that this period is in general proportional to the dose of Naganol originally given. The refractory period had also been found to vary considerably in individual camels. In more absolute terms, as applied to the four gramme dose of Naganol that has now been given as a routine for three or four years, it was known that this dose cured "nearly all" camels and that following cure some individuals were "immune" for at least four months while others were susceptible after less than half this interval. Experiments in a laboratory could never be on a sufficiently large scale to afford more precise information and it was therefore hoped to obtain it in the field.

As already stated, field veterinary officers have been unable to spare much time for critical observation of individual camels, and, as they are no more likely to be able to in the future, it is advisable to record such conclusions as can now be drawn. The particular points at issue have been the relapse rate and the refractory period following treatment with a single four gramme dose of Naganol, and arising out of these the justification for increasing the dose.

First, regarding the efficacy of a single four gramme dose : it is known that a few relapses occur, amounting to something between units per hundred and units per thousand. Field observation has done little to afford an estimate in more precise terms, largely owing to the impossibility under field conditions of distinguishing with certainty between relapses and reinfections. There is, however, still no reason for regarding the relapse rate as anything but small. In any case, whatever the rate, the question of critical importance is whether a camel not cured by four grammes will be cured by a slightly larger dose;

on this will depend the justification or otherwise for increasing the routine curative dose. Experience both in the field and in the laboratory has shown that this is not necessarily the case, and the few camels not cured by four grammes are often not cured by much larger doses, or by repeated four gramme doses given at such short intervals that the cumulative effect is virtually that of a single large dose. Individual idiosyncrasy is thus so potent a factor that it does not as yet seem economically justifiable to enlarge the routine dose, since the increase would, from the standpoint at primary cure, be wasted on most camels. It seems therefore that one must continue to allow a few camels to relapse; their fate must depend on the amount of individual attention that can be spared for them.

Next, regarding the duration of "immunity" after cure. Evidence is again not conclusive. In an infected area the mercuric chloride test loses much of its value, since in a genuinely cured camel a positive reaction may need as long as three months to disappear, while it is already known that the duration of "immunity" after cure may be less than two months. In any case, in the Sudan the range of a field veterinary officer's duties is too great to permit of the frequent testing of large numbers of camels. However, starting with the knowledge gained in earlier years that the true relapse rate is low, it is permissible to conclude that if relatively large numbers of infected camels are found among those treated and subsequently exposed to infection, most of these are cases of re-infection. Observations along these lines have led to the conclusion that the "immune" period following treatment may in many individuals be substantially less than two months, and when large numbers of camels are under observation the period is in some cases so short as to overlap that during which a true relapse may occur. On this account, and owing to the infrequency with which some camels can be inspected, the routine dose of Naganol has been provisionally raised to five grammes. Thus briefly stated, the increase in routine dosage is designed rather to prolong slightly the "immune" period after treatment than to reduce the relatively negligible relapse rate.

For co-operation in carrying out large scale field observations, often in very difficult circumstances, the laboratory is particularly indebted to Captain J. Going of this Service.

II. EQUINE TRYPA NOSOMIASIS CAUSED BY TRYP. CONGOLENSE

In this Report for 1934 note was made of one case of equine T.congolense infection treated with Surfen C (Bayer). The patient was cured and is still at work. In addition to the fact of cure, it was shown that the drug could not safely be given intravenously or subcutaneously but that intramuscular injection was suitable. During 1935 thirteen further cases of natural T.congolense infection in horses became available for experimental treatment with this drug. The results are being written up for publication, but it may here be briefly stated that twelve of the thirteen were cured and the thirteenth is still alive after six months' treatment but is not yet cured. The dose recommended by the manufacturers cures some patients but in others larger and repeated doses are necessary.

The preparation is thus an extremely valuable addition to veterinary medicine, being in fact the first drug yet available that will cure equine T.congolense with any degree of certainty, but in consequence of the individual observation that must be extended to each patient its use will be restricted to a much narrower field than obtains for example with Naganol in the treatment of camel trypanosomiasis.

III. BOVINE TRYPANOSOMIASIS CAUSED BY TRYP. CONGOLENSE.

Experimental treatment was again carried out at Malakal both with Antimosan (Bayer) and Surfen (Bayer), and the Assistant Veterinary Research Officer (Mr. J.T.R. Evans) hopes shortly to publish a paper on the work.

Briefly, Antimosan treatment took the form of "courses" of five intravenous injections of 40 c.c. of the solution dispensed by the makers, as it had been found last year that less than this was of no practical use. Such courses cured all beasts treated, cure being checked not only by microscopic blood examination but also by subsequent subinoculation of small animals.

Cattle treated with Surfen C were given a single injection of 1 gm./100 Kg. in one per cent. solution intramuscularly. Cure was in their case also checked by subinoculation, and all of the few treated beasts were cured. In view of the paper shortly to be published; it is not necessary to enlarge on the subject in this Report.

IV. EQUINE CUTANEOUS LEISHMANIASIS.

One case, the first recorded in veterinary literature, was detected in material sent to the laboratory from Southern Kordofan. The horse was sent to Khartoum for observation. The lesions appeared to be exactly the same as in human oriental sore and the parasites were equally indistinguishable from Leishmania tropica. The treatment of human oriental sore in India with Berberine Sulphate was brought to my notice by the Government Bacteriologist and it was decided to try this drug. Briefly stated, a cure was effected by a single local treatment at which 4 c.c. of a one per cent. solution were injected at several sites around the sore. One is not always so fortunate as to discover both a new pathological condition, and the cure for it, virtually in a single day.

A paper on this case has already been published.

C. PUBLICATIONS.

One paper only has been published during the year :-

BENNETT, S.C.J. Equine Cutaneous Leishmaniasis :
Treatment with Berberine Sulphate. - Jour.
Comp. Path. & Therap., 1935, Vol.48, pp.241-3.

D. SUMMARY.

The main feature of the year's work has been a further increase in all sections of routine work. Cattle plague serum issues rose from 95,340 to 110,160 doses, pleuro-pneumonia vaccine from 47,260 to 51,090, Naganol and associated products from 4,219 to 10,081 and specimens examined from 452 to 547. In addition, 41,646 doses of cattle plague vaccine were issued, this being the first year in which the product was prepared. These increases, coming as they have done following repeated steady increases in earlier years have aggravated the existing congestion of both the Khartoum and Malakal laboratories. Extensions have, however, been promised for both places during 1936.

Research has naturally continued to suffer. Nevertheless some research has been possible. Studies on cattle plague vaccine have continued, a paper is being published on the work, and the vaccine is now a routine issue. Field observations in collaboration with the Laboratory have continued on the control of camel trypanosomiasis (Tryp. evansi) and information of practical importance has been obtained and instrumented. The treatment of Trypanosoma congolense in both cattle and horses with the new Bayer preparation Surfen C has been studied and its usefulness demonstrated. The first recorded case of equine cutaneous leishmaniasis was studied and the curative effect of Berberine Sulphate shown.

There has been no increase in personnel, entailing heavy demands on the existing small staff, all of whom have, as in earlier years, willingly borne their share of extra work.

(Signed) S.C.J. Bennett

Khartoum,
20-2-1936.

VETERINARY RESEARCH OFFICER
SUDAN GOVERNMENT.

SAM.



Handwritten in red ink:
1930
1931
1932
1933